

MULTISPECTRAL EVIDENCE OF ALTERATION FROM MURRAY RIDGE TO MARATHON VALLEY OBSERVED BY THE OPPORTUNITY PANCAM ON THE RIM OF ENDEAVOUR CRATER, MARS

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The Mars Exploration Rover Opportunity has been traversing the rim of the Noachian-aged, 22 km diameter Endeavour crater. Circa sol 3390 of its mission, Opportunity reached the northern tip of the rim segment known as Solander Point and has since been traversing the rim to the south to its current location at the break in the rim known as Marathon Valley. The rocks making up the rim are dominated by impact breccias consisting of clasts and a finer-grained matrix. Several segments of the rim are transected by fractures as observed from orbital HiRISE imagery. Pancam multispectral observations of outcrop in these fracture regions, including part of the rim crest dubbed Murray Ridge, the Hueytown fracture, and Marathon Valley have been made. Over the range of 430 to 1010 nm there are changes in the multispectral reflectance signature of the breccia matrix with an increase in 535 nm and 904 nm band depth. This is attributed to oxidation and an increase in ferric oxides in these areas. In situ observations by the rover's APXS also indicate chemical differences associated with the matrix along these fractures, including increasing Fe/Mn southward from Solander Point to a region having an Al-OH signature in CRISM spectra, and generally higher SO₃ in the Hueytown fracture region and the area around Spirit of St. Louis. Overturned rocks observed on Murray Ridge were determined by the APXS to have elevated Mn and Pancam spectra of the high Mn spots have a characteristic red, featureless slope. This spectrum was also observed in association with some coatings on blocks of the sulfate-rich Grasberg formation. Spectra resembling red hematite are observed in some zones in association with the craterform feature Spirit of St. Louis outside the mouth (to the west) of Marathon Valley. Marathon Valley itself has been observed from orbital hyperspectral observations by the CRISM sensor to host occurrences of Fe/Mg smectite minerals- indicating extensive aqueous alteration in this region. Pancam observations in Marathon Valley will play an important role in surveying outcrop and making VNIR spectral comparisons with clay bearing outcrop examined earlier in the mission at the Matijevic Hill region.